Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1. (Currently Amended) An apparatus for accessing and gripping disc-shaped wafers supported in a housing and having peripheral position indicators, comprising:

a rigid support structure, said rigid support structure being dimensioned to enable movement into and out of said housing between adjacent wafers without physically engaging said wafers;

a plurality of ~~fixed,~~ rotatable wafer supports mounted on said rigid support structure at locations selected so as to support a said wafer on said rigid support structure only around its periphery; and

a rotatable driver mounted on said rigid structure at a position to engage said periphery of said wafer when supported by said rotatable wafer supports, and selectively operable to rotate said wafer while supported by said rotatable wafer supports to a selected radial position.

2. (Original) The apparatus of claim 1 wherein said rigid support structure has a proximal end adapted for connection to a displacement means, and a distal end.

3. (Original) The apparatus of claim 2 wherein at least some of said plurality of rotatable wafer supports are mounted near said distal end, and at least one of said plurality of rotatable wafer supports is mounted near said proximal end.

4. (Original) The apparatus of claim 2 wherein said rotatable driver is mounted near said proximal end.

5. (Original) The apparatus of claim 1 wherein said rigid support structure comprises:

a rigid frame dimensioned to lie substantially in a plane;

said frame comprising a pair of elongated rigid arms having proximal and distal ends;

said arms being connected at their respective proximal and distal ends by proximal and distal support bars respectively.

6. (Original) The apparatus of claim 5 wherein said elongated arms are substantially parallel and are of greater length than said support bars, said elongated arms and said support bars being dimensioned relative to each other to form a substantially rectangular-shaped frame with a substantially open interior.

7. (Original) The apparatus of claim 5 wherein at least two of said rotatable wafer supports are mounted on said distal support bar, at least one of said rotatable wafer supports is mounted on said proximal cross bar, and said rotatable driver is mounted on said proximal cross bar.

8. (Original) The apparatus of claim 1 wherein said rotatable wafer supports are mounted on said rigid support structure at selected locations substantially distributed about said periphery of said wafer, and wherein said wafer supports are free to rotate about an axis substantially perpendicular to the plane of said wafer.

9. (Original) The apparatus of claim 1 wherein said wafer supports comprise rotatable rollers having a shape adapted to engage only said periphery of said wafer when in contact with said wafer.

10. (Original) The apparatus of claim 9 wherein said wafer supports comprise a first truncated wafer contact surface adapted to engage a peripheral edge of said wafer.

11. (Original) The apparatus of claim 10 wherein said first truncated wafer contact surface forms an angle (ÿ) between approximately 5 and 45 degrees with a line perpendicular to the plane of said semiconductor wafer.

12. (Original) The apparatus of claim 11 wherein said wafer supports have a second truncated surface adapted to support said peripheral edge of said wafer, said second truncated surface being sloped relative to the adjacent surface of said semiconductor wafer, a peak of said second truncating surface abutting said first truncated surface, and forming an angle with respect to said line perpendicular to the plane of said semiconductor wafer which is larger than the angle (ÿ) formed between said first truncated surface and said line.

13. (Original) The apparatus of claim 1 wherein said rotatable driver comprises:

a roller having a friction drive surface adapted to engage a peripheral edge of a said wafer; and

a motor for selectively rotatably driving said roller.

14. (Original) The apparatus of claim 13 wherein said friction drive surface is comprised of a soft rubber material.

15. (Original) The apparatus of claim 1 wherein one of said wafer supports comprises said rotatable driver.

16. (Original) The apparatus of claims 1, comprising:

a first optical detector mounted on said rigid support structure, said first optical detector being operable to detect when said wafer is in said selected radial position and to generate a signal indicating the same.

17. (Original) The apparatus of claim 16 wherein said first optical detector comprises:

a first optical emitter mounted on said rigid support structure at a first selected location relative to said periphery of said wafer, said first optical emitter being operable to emit a first light beam at said first selected location; and

a corresponding first optical receiver mounted on said rigid support in proximity to said first selected location relative to said periphery of said wafer, said first optical receiver

being operable to detect the presence and absence of said first light beam depending on the position of said peripheral position indicator relative to said first optical detector.

18. (Original) The apparatus of claim 17 wherein said peripheral position indicator is an opening in said periphery of said wafer.

19. (Original) The apparatus of claim 18 wherein:

said first optical emitter is mounted on said rigid support structure on one side of said wafer; and

said first optical receiver is mounted on said rigid support structure on the opposite side of said wafer opposite said first optical emitter;

whereby when said wafer is in a radial position other than said selected radial position, said periphery of said wafer blocks said light beam and said light beam is not received by said first receiver, and when said wafer is in said selected radial position, said light beam is received by said first optical receiver through said opening, and said first optical receiver generates a signal indicating the same.

20. (Original) The apparatus of claim 16 wherein said rotatable driver is responsive to said signal indicating said wafer is in said selected radial position to stop rotating said wafer.

21. (Original) The apparatus of claim 16, further comprising:

a wafer guide mounted on said rigid support structure, said wafer guide being operable to detect a position of said wafer relative to said rigid support structure and to generate at least one signal indicating the same.

22. (Original) The apparatus of claim 21 wherein said wafer guide is operable to detect the position of said wafer relative to said rigid support structure as said rigid structure and said wafer approach in substantially parallel planes.

23. (Original) The apparatus of claim 22 wherein said wafer guide is operable to detect the position of said wafer relative to said rigid support structure in X and Y directions in a substantially horizontal plane.

24. (Original) The apparatus of claim 21 wherein said wafer guide comprises:

a second optical detector mounted on said rigid structure at a selected location a predetermined distance from said first optical detector, said second optical detector being operable independently of said first optical detector to detect the presence and absence of said periphery of said wafer, and to generate at least one signal indicating the same.

25. (Original) The apparatus of claim 24 wherein said second optical detector comprises:

a second optical emitter mounted on said rigid support structure at a second selected position a predetermined distance from said first optical emitter, and being selectively operable independent of said first optical emitter to emit a second light beam at said second selected position; and

a second optical receiver mounted on said rigid support structure in proximity to said second selected position, said second optical receiver being selectively operable independently of said first optical receiver to detect the presence and absence of said second light beam, and to generate at least one signal indicating the same, said signal indicating the presence and absence of said periphery of said wafer relative to said second selected position on said rigid structure.

26. (Original) The apparatus of claim 25 wherein:

said second optical emitter is mounted on said rigid support structure on one side of said wafer; and

said second optical receiver is mounted on said rigid support structure on the opposite side of said wafer opposite said first optical emitter;

whereby as said rigid structure and said wafer approach, when said periphery of said wafer has not reached said second selected position, said second light beam is not blocked

by said periphery of said wafer and said second light beam is received by said second receiver, and when said periphery of said wafer reaches said second selected position, said second light beam is blocked by said periphery of said wafer and is not received by said second optical receiver, and said second optical receiver generates a signal indicating the same.

27. (Original) The apparatus of claim 24 wherein said wafer guide further comprises:

a third optical detector mounted on said rigid structure at a selected location a predetermined distance from said first and second optical detectors, said third optical detector being operable independently of said first and second optical detectors to detect the presence and absence of said periphery of said wafer, and to generate at least one signal indicating the same.

28. (Original) The apparatus of claim 27 wherein said third optical detector comprises:

a third optical emitter mounted on said rigid support structure at a third selected position a predetermined distance from said first and second optical emitters, and being selectively operable independent of said first and second optical emitters to emit a third light beam at said third selected position; and

a third optical receiver mounted on said rigid support structure in proximity to said third selected position, said third optical receiver being selectively operable independently of said first and second optical receivers to detect the presence and absence of said third light beam, and to generate at least one signal indicating the same, said signal indicating the presence and absence of said periphery of said wafer relative to said third selected position on said rigid structure.

29. The apparatus of claim 28 wherein:

said third optical receiver is mounted on said rigid support structure on the opposite side of said wafer opposite said third optical emitter;

whereby as said rigid structure and said wafer approach, when said periphery of said wafer has not reached said third selected position, said third light beam is not blocked by

said periphery of said wafer and said third light beam is received by said third receiver, and when said periphery of said wafer reaches said third selected position, said third light beam is blocked by said periphery of said wafer and is not received by said third optical receiver, and said third optical receiver generates a signal indicating the same.

30. (Original) The apparatus of claim 1 wherein each of said wafer supports comprises an adjacent pair of rotatable rollers distributed around the periphery of said wafer, each having a shape adapted to engage only said periphery of said wafer when in contact with said wafer, said adjacent pair of rollers being spaced by a distance greater than the dimension of a said peripheral position indicator on a said wafer.

31. (Currently Amended) An apparatus for accessing and gripping a plurality of adjacent disc-shaped wafers supported in a housing and having peripheral position indicators simultaneously, comprising:

a plurality of adjacent rigid support structures, said rigid support structures each being dimensioned to enable movement into and out of said housing between adjacent wafers without physically engaging said wafers;

a plurality of ~~fixed,~~ rotatable wafer supports mounted on each said rigid support structure at locations selected so as to support a said wafer on said rigid support structure only around its periphery; and

a rotatable driver mounted on each said rigid support structure at a position to engage a said periphery of a said wafer when supported by said rotatable wafer supports, and selectively operable to rotate said wafer while supported by said rotatable wafer supports to a selected radial position.

32. (Original) The apparatus of claim 31 wherein each said rigid support structure has a proximal end adapted for connection to a common displacement means, and a distal end.

33. (Original) The apparatus of claim 31 wherein each of said rigid support structures comprises:

a rigid frame dimensioned to lie substantially in a plane;

said frame comprising a pair of elongated rigid arms having proximal and distal ends;

said arms being connected at their respective proximal and distal ends by proximal and distal support bars respectively;

whereby said rigid support structures lie in a plurality of adjacent, substantially parallel planes.

34. (Original) The apparatus of claim 31 wherein said rotatable wafer supports are mounted on each said rigid support structure at selected locations substantially distributed about a said periphery of a said wafer, and wherein said wafer supports are free to rotate about an axis substantially perpendicular to the plane of a said wafer.

35. (Original) The apparatus of claim 31 wherein said wafer supports comprise rotatable rollers having a shape adapted to engage only a said periphery of a said wafer when in contact with a said wafer.

36. (Original) The apparatus of claim 31 wherein each said rotatable driver comprises:

a roller having a friction drive surface adapted to engage a peripheral edge of a said wafer; and

a motor for selectively rotatably driving said roller.

37. (Original) The apparatus of claim 31 wherein one of said wafer supports mounted on each said rigid support structure comprises said rotatable driver.

38. (Original) The apparatus of claim 31, comprising:

a first optical detector mounted on each said rigid support structure, said first optical detector being operable to detect when a said wafer is in said selected radial position and to generate a signal indicating the same.

39. (Original) The apparatus of claim 38, further comprising:

a wafer guide mounted on each said rigid support structure, each said wafer guide being operable to detect a position of a said wafer relative to a said rigid support structure and to generate at least one signal indicating the same.

40. (Original) The apparatus of claim 39 wherein each said wafer guide is operable to detect the position of a said wafer relative to a said rigid support structure as said rigid structure and said wafer approach in substantially parallel planes.

41. (Original) The apparatus of claim 40 wherein each said wafer guide is operable to detect the position of a said wafer relative to a said rigid support structure in X and Y directions in a substantially horizontal plane.

42. (Original) The apparatus of claim 39 wherein each said wafer guide comprises:

a second optical detector mounted on a said rigid structure at a selected location a predetermined distance from said first optical detector, said second optical detector being operable independently of said first optical detector to detect the presence and absence of said periphery of said wafer, and to generate at least one signal indicating the same.

43. (Original) The apparatus of claim 42 wherein each said wafer guide further comprises:

a third optical detector mounted on a said rigid structure at a selected location a predetermined distance from said first and second optical detectors, said third optical detector being operable independently of said first and second optical detectors to detect the presence and absence of said periphery of said wafer, and to generate at least one signal indicating the same.